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| 09/826,416 | 04/05/2001 | Tatsuya Arao | 0756-2293 | 5035 |

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EXAMINER

TRAN, THIEN F

| ART UNIT | PAPER NUMBER |
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2811

DATE MAILED: 12/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/826,416

Applicant(s)

ARAO ET AL.

Examiner

Thien F Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,4,21-24 and 26-42 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 2,4,21-24 and 26-42 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 2, 4, 22 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Oana et al. (USPN 6,008,869).

Oana et al. discloses the claimed semiconductor device (Fig. 7F) comprising a first wiring (a data wiring 105a) and a second wiring (a pixel electrode 151) formed on an insulating surface; barrier metal layers (105b, 131b) formed on the first and second wirings so as to correspond to the first and second wirings; a semiconductor film 119 of one conductivity type formed on the barrier metal layers which the examiner characterizes as comprising two layers (a lower layer as a first semiconductor film and an upper layer as a second semiconductor film), wherein the second semiconductor film formed on an upper layer of the first semiconductor film across the first wiring and the second wiring; a gate insulating film 114 formed on the second semiconductor film; and a third conductive film (a gate electrode 111) formed on the gate insulating film, wherein an end portion of the second conductive film 119 is formed inside an end portion of the second conductive film.

Regarding claims 22 and 27, each of the data wiring and the pixel electrode comprises an indium tin oxide film (ITO).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oana et al. (USPN 6,008,869) in view of Kim et al. (USPN 5,917,564).

Oana et al. as described above does not explicitly disclose the data wiring 105a and the pixel electrode 151 comprising aluminum. Kim et al. discloses a semiconductor device (Figs. 9A-9C) comprising a second conductive layer of aluminum that is patterned as a data wiring 2 and as a pixel electrode 17. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to form the data wiring and the pixel electrode in Oana et al. of aluminum as taught by Kim et al. in order to provide wirings of low resistivity.

Claims 23, 24, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oana et al. (USPN 6,008,869) in view of Kim et al. (USPN 6,100,954).

Oana et al. as described above does not explicitly disclose the gate electrode (third conductive film) comprising at least one element selected from the group consisting of Al, Cr, Ta, Ti, W and an alloy containing the element. These materials are known in the art and routinely used to form gate electrodes in semiconductor device as shown for example by Kim et al. (see col. 16, lines 66-67 and col. 17, lines 1-2).

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Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select any one of these materials as a suitable conductive material for the gate electrode of 111 of Oana et al., since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of design choice. In re Leshin, 125 USPQ 416.

Regarding claims 24 and 29, the recitation "the semiconductor device is one selected from the group consisting of a mobile phone, a video camera, a portable information terminal, a liquid crystal TV receiver, a portable book, a personal computer, a DVD player, and a digital still camera" in the claim preamble specifies an intended use or field of use is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Furthermore, it is known that all of these devices employ a liquid crystal display device. It would have been obvious to incorporate the liquid crystal display device of the above combined

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references into these devices for the advantages that the liquid crystal display device provides as described above.

Claims 2, 4, 22-24, 27-31, 33-35, 37, 38, 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi (USPN 6,285,041) in view of Ho et al. (USPN 5,528,082) and Kim et al. (USPN 6,100,954).

Noguchi discloses a semiconductor device (Fig. 18) comprising a data wiring (a first wiring) 117 and a pixel electrode (a second wiring) 117 formed on an insulating surface wherein the wirings are separated from each other; a pair of barrier metal layers (106, 107) formed so as to correspond to the data wiring and the pixel electrode; a pair of first semiconductor films 105 of one conductivity type formed on the pair of barrier metal layers; a second semiconductor film 104 formed on and extending between the pair of first semiconductor films; a gate insulating film 103 formed on the second semiconductor film; and a gate electrode (a third conductive film) 102 formed on the gate insulating film. Noguchi does not disclose the thin film structure (layers 106, 107, 105, 104, 103 and 102) having tapered sidewalls. Kim et al. shows a thin film structure (Fig. 3D) having tapered sidewalls and Ho et al. also discloses thin film structure having tapered sidewalls with any desired angle of taper no greater than 60° . It would have been obvious to a person having ordinary skill in the art at the time the invention was made to form the thin film structure of Noguchi having tapered sidewalls with a tapered angle of 30° as taught by Ho et al. and Kim et al. in order to reduce step coverage problems. Consequently, the barrier metal layers have a tapered outer edge, each of the first semiconductor films and the second semiconductor film has a tapered outer

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edge and a gate electrode has a tapered outer edge; wherein the gate insulating film extends beyond outer edge of the gate electrode, the second semiconductor film extends beyond outer edge of the gate insulating film and side edges of the gate electrode, and the pair of first semiconductor films extend beyond side edges of the second semiconductor film.

Regarding claims 2 and 4, due to tapered sidewalls of the thin film structure, an end portion of the second semiconductor film is inside an end portion of the barrier metal.

Regarding claims 22 and 27, each of the data wiring and the pixel electrode comprises an indium tin oxide film (ITO).

Regarding claims 23 and 28, the modified Noguchi as described above does not explicitly disclose the gate electrode (third conductive film) 102 comprising at least one element selected from the group consisting of Al, Cr, Ta, Ti, W and an alloy containing the element. These materials are known in the art and routinely used to form gate electrodes in semiconductor device as shown for example by Kim et al. (see col. 16, lines 66-67 and col. 17, lines 1-2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select any one of these materials as a suitable conductive material for the gate electrode of 102 of Noguchi, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of design choice. In re Leshin, 125 USPQ 416.

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Regarding claims 24 and 29, the recitation "the semiconductor device is one selected from the group consisting of a mobile phone, a video camera, a portable information terminal, a liquid crystal TV receiver, a portable book, a personal computer, a DVD player, and a digital still camera" in the claim preamble specifies an intended use or field of use is treated as nonlimiting since it has been held that in device claims, intended use must result in a structural difference between the claim invention and the prior art in order to patentably distinguish the claim invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Furthermore, it is known that all of these devices employ a liquid crystal display device. It would have been obvious to incorporate the liquid crystal display device of the above combined references into these devices for the advantages that the liquid crystal display device provides as described above.

Claims 21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi (US 6,285,041) in view of Ho et al. (USPN 5,528,082) and Kim et al. (USPN 6,100,954) as applied to claims 2 and 4 above, and further in view of Kim et al. (US 5,917,564).

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The modified Noguchi as described above does not explicitly disclose the data wiring 117 and the pixel electrode 117 comprising aluminum. Kim et al. discloses a semiconductor device (Figs. 9A-9C) comprising a second conductive layer of aluminum that is patterned as a data wiring 2 and as a pixel electrode 17. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to form the data wiring 117 and the pixel electrode 117 in the modified Noguchi of aluminum as taught by Kim et al. in order to provide wirings of low resistivity.

Claims 32, 36, 39 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi (USPN 6,285,041) in view of Ho et al. (USPN 5,528,082) and Kim et al. (USPN 6,100,954) as applied to claims 30, 34, 37 and 40 above, and further in view of Oana et al. (USPN 6,008,869).

The combined references as described above do not disclose the pair of barrier metal layers (106, 107) being formed of Ti or Ta. However, Ti, Ta or Cr are barrier materials known in the art and routinely used to form barrier layers in semiconductor device as shown for example by Oana et al. (see col. 11, lines 22-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select any one of these materials as a suitable barrier material for the barrier metal layers 106, 107 of Noguchi, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of design choice. In re Leshin, 125 USPQ 416.

Conclusion

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thien F Tran whose telephone number is (703) 308-4108. The examiner can normally be reached on 8:30AM - 5:00PM Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

tt
December 6, 2002



Thien Tran
Patent Examiner
Technology Center 2800